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A Systematic Study on the Korean Anthozoa

11. Cnidae of Scleractinia

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韓國產 珊瑚蟲類의 系統分類學的 研究

11. 돌산호類의 刺胞

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摘 要

한국 해역에서 알려진 돌산호류 6과 17종 중 대표적인 5과 7종을 택하여 刺胞의 분포를 조사한 결과 6형의 刺胞을 지니고 있었으며 이들은 다음과 같다. atrichous isorhizas, basitrichous isorhizas, holotrichous isorhizas, microbasic p-mastigophores, microbasic b-mastigophores 및 spirocysts.

Key words: Systematic, Anthozoa, Cnidae, Scleractinia, Korea.

INTRODUCTION

Since the extensive works on the cnidae (nematocysts) of Cnidaria had been done by Weill (1934), several investigators (Carlgren, 1940; Picken & Skear, 1966; Schmidt, 1974) pointed out that the nematocysts might serve as taxonomic and phylogenetic characters of the Cnidaria. The information on the nematocysts of the Anthozoa was provided by Carlgren (1940, 1945, 1949), Cutress (1955), Hand (1954, 1955a, 1955b), Schmidt (1974) and Mariscal (1974); nevertheless, its contribution on the cnidae of Scleractinia is so negligible that further studies are required. Particularly there is a complete lack of knowledge on the cnidae of Korean scleractinians. In the present study, the writer examined the distribution of cnidae on Korean scleractinians.

MATERIALS AND METHODS

Out of 17 species of seven families of Korean Scleractinia which were reported by Song (1982), seven species of five families were examined in the present study. The examination of cnidae was conducted in the fixed and/or the fresh specimens by applying the same methods as in the previous paper (Song, 1984). The size and distribution of the cnidae occurred in scleractinians were described with plate figures, and they were measured with an ocular micrometer. It must be noted that the variation of the size of cnidae was observed among different individuals of the same species, therefore the maximum and the minimum of length and width are given for the size of each cnidae. The terminology of the cnidae reviewed by Mariscal (1974) is used in the following descriptions.

RESULTS

Family Poritidae Gray, 1842

1. *Alveopora japonica* Eguchi, 1968

(Pl. 1, Figs. 1-6)

Material examined: Sŏgwip'o, Jan. 18, 1985, J.I. Song.

Cnidom: Basitrichous isorhizas, holotrichous isorhizas, microbasic p-mastigophores, microbasic b-mastigophores, spirocysts.

Distribution and size (in μ) of cnidae are as follows:

Tentacles:

Holotrichous isorhizas (rare)	15.7-18.6×4.3-5.0
Microbasic p-mastigophores	18.6-25.8×5.7-6.6
Microbasic b-mastigophores	14.3-18.6×6.4-7.2
Spirocysts (very rare)	21.5-32.9×3.6-5.0

Actinopharynx:

Microbasic p-mastigophores (rare)	25.7-28.6×7.2-8.6
	44.3-47.7×9.5-10.9

Filaments:

Holotrichous isorhizas	17.2-18.6×6.9-7.9
Microbasic p-mastigophores	17.2-22.9×6.4-7.2
	30.0-32.9×8.3-8.6
	44.3-47.7×9.6-10.9

Column:

Basitrichous isorhizas (very rare)	17.2-25.7×3.6-4.3
Microbasic p-mastigophores	18.6-25.8×6.4-7.9
	30.0-32.9×8.3-8.6
	44.3-47.7×9.5-10.9

Family Rhizangiidae d'Orbigny, 1851

2. *Culicia japonica* Yabe & Eguchi, 1936

(Pl. 1, Figs. 7-10)

Material examined: Sambudo, July 21, 1982, J.I. Song, 20m depth.

Cnidom: Holotrichous isorhizas, microbasic p-mastigophores, microbasic b-mastigophores, spirocysts.

Distribution and size (in μ) of cnidae are as follows:

Tentacles:

Microbasic p-mastigophores (rare)	35.8-42.9×7.2-8.6
Microbasic b-mastigophores	32.9-42.9×5.0-7.2
Spirocysts	20.0-35.8×3.5-5.5

Actinopharynx:

Holotrichous isorhizas	28.6-35.8×10.0-17.2
Microbasic b-mastigophores (rare)	27.2-37.2×4.3-5.7

Filaments:

Holotrichous isorhizas	27.2-37.2×12.2-14.3
Microbasic p-mastigophores	22.9-32.9×7.2-11.5

Column:

Microbasic p-mastigophores (rare)	21.5-32.9×7.2-11.5
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Family Caryophylliidae Gray, 1847

3. *Caryophyllia japonica* Marenzeller, 1888

(Pl. 3, Figs. 9-11)

Material examined: Mipo, Nov. 26, 1983, J.I. Song.

Cnidom: Holotrichous isorhizas, microbasic p-mastigophores, spirocysts.

Distribution and size (in μ) of cnidae are as follows:

Tentacles:

Holotrichous isorhizas	37.2-44.4×12.9-15.0
Microbasic p-mastigophores	44.4-54.4×5.7-7.2
Spirocysts	22.9-38.6×4.0-4.8

Actinopharynx:

Microbasic p-mastigophores	40.0-47.2×5.0-7.2
	50.1-83.0×10.0-18.6
Spirocysts	21.5-34.3×3.6-5.5

Filaments:

Microbasic p-mastigophores	24.3-28.6×6.4-7.9
	54.3-60.1×10.0-11.5
	78.6-83.0×13.6-14.3

Column:

Holotrichous isorhizas	68.6-85.8×17.2-18.6
Microbasic p-mastigophores	21.5-24.3×6.0-6.5 (rare)
	71.5-78.7×12.9-14.6

4. *Desmophyllum insignis* (Duncan, 1876)

(Pl. 2, Figs. 1-5)

Material examined: Sögwip'o, Oct. 9, 1986, S. Shin & J.H. Park, 15-20m depth.

Cnidom: Basitrichous isorhizas, holotrichous isorhizas, microbasic p-mastigophores, microbasic b-mastigophores, spirocysts.

Distribution and size (in μ) of cnidae are as follows:

Tentacles:

Basitrichous isorhizas (rare)	17.2-30.0 \times 4.0-4.8
Holotrichous isorhizas	54.3-73.0 \times 22.9-27.2
Microbasic p-mastigophores	45.7-98.7 \times 6.0-8.6
Microbasic b-mastigophores	60.1-68.7 \times 6.4-6.9
Spirocysts	27.2-51.5 \times 4.8-7.2

Actinopharynx:

Basitrichous isorhizas (rare)	17.2-18.6 \times 4.0-4.3
Holotrichous isorhizas	54.3-65.8 \times 20.0-27.2
Microbasic p-mastigophores (rare)	18.6-21.5 \times 6.4-6.9
	47.2-52.9 \times 6.9-7.2
Microbasic b-mastigophores	31.5-42.9 \times 5.7-6.9
Spirocysts (rare)	24.3-37.2 \times 4.6-5.0

Filaments:

Holotrichous isorhizas (rare)	47.2-57.2 \times 21.5-24.3
Microbasic p-mastigophores	45.8-53.0 \times 8.3-10.0

Column:

Holotrichous isorhizas	62.9-73.0 \times 24.3-27.2
Microbasic p-mastigophores	21.5-41.5 \times 6.9-8.6
Microbasic b-mastigophores (rare)	14.3-17.2 \times 4.5-4.8

Family Flabellidae Bourne, 1905

5. *Flabellum transversale* Moseley, 1881

(Pl. 2, Figs. 6-11)

Material examined: Mipo, Jan. 12, 1984, H.S. Han.

Cnidom: Basitrichous isorhizas, holotrichous isorhizas, microbasic p-mastigophores, microbasic b-mastigophores, spirocysts.

Distribution and size (in μ) of cnidae are as follows:

Tentacles:

Basitrichous isorhizas (rare)	12.9-24.3 \times 2.8-3.3
Holotrichous isorhizas	78.6-80.1 \times 27.2-29.3
Microbasic p-mastigophores	15.7-25.8 \times 7.1-7.9
	37.2-50.0 \times 6.9-8.6
Microbasic b-mastigophores	18.6-21.5 \times 5.7-7.2
Spirocysts	20.0-37.2 \times 4.0-5.7

Actinopharynx:

Holotrichous isorhizas	68.6-121.6 \times 25.7-32.9
Microbasic p-mastigophores (rare)	20.0-24.3 \times 4.3-5.7
	41.5-64.4 \times 5.7-8.6
Microbasic b-mastigophores	8.6-21.5 \times 4.3-5.7
	28.6-54.4 \times 5.7-7.2
Spirocysts (rare)	25.7-40.1 \times 4.3-6.0

Filaments:

Holotrichous isorhizas	78.7-114.4×25.7-31.5
Microbasic p-mastigophores	42.9-63.0×6.9-8.6
Column:	
Holotrichous isorhizas	57.2-128.7×22.9-32.9
Microbasic p-mastigophores	18.6-24.3×6.0-6.5
Microbasic b-mastigophores (rare)	12.9-20.0×4.3-6.5
Spirocysts (very rare)	20.0-35.8×4.3-5.7

Family Dendrophylliidae Gray, 1847

6. *Dendrophyllia cribrosa* M. Edw. & H. 1860 (Pl. 3, Figs. 1-8)

Material examined: Sanju, May 20, 1981, J.I. Song, 30-40m depth.

Cnidom: Atrichous isorhizas, holotrichous isorhizas, microbasic p-mastigophores, microbasic b-mastigophores, spirocysts.

Distribution and size (in μ) of cnidae are as follows:

Tentacles:

Atrichous isorhizas	22.9-37.2×6.0-6.9
Holotrichous isorhizas	37.2-39.6×7.2-7.5
Microbasic p-mastigophores	18.6-27.2×7.2-9.3
	34.3-38.6×5.7-7.2
Microbasic b-mastigophores	28.6-37.2×5.7-7.2
Spirocysts	24.3-42.9×4.3-5.7

Actinopharynx:

Atrichous isorhizas	35.8-37.2×6.4-6.9
Microbasic b-mastigophores	18.6-21.5×5.0-5.7 (rare)
	35.8-38.6×5.7-6.5
Spirocysts	21.5-35.8×3.6-4.6

Filaments:

Holotrichous isorhizas	27.2-38.6×7.1-11.4
Microbasic p-mastigophores	24.3-44.3×7.2-12.9
	35.7-37.2×6.0-6.5 (rare)
Spirocysts	25.7-32.9×4.3-5.5

Column:

Holotrichous isorhizas	61.5-78.7×17.2-20.0
Microbasic b-mastigophores (rare)	15.7-25.7×4.5-5.5
Spirocysts	27.2-44.3×4.0-6.6

7. *Tubastraea coccinea* (Ehrenberg, 1834) (Pl. 1, Figs. 11-18)

Material examined: Mundo, July 13, 1985, J.I. Song, 10m depth.

Cnidom: Basitrichous isorhizas, holotrichous isorhizas, microbasic p-mastigophores, microbasic b-mastigophores, spirocysts.

Distribution and size (in μ) of cnidae are as follows:

Tentacles:

Holotrichous isorhizas	45.8-52.9×8.6-10.0
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Microbasic p-mastigophores	42.9-54.4×7.2-8.6
Spirocysts	30.0-48.7×4.3-7.2
Actinopharynx:	
Holotrichous isorhizas	34.3-50.1×7.4-10.0
Microbasic p-mastigophores (rare)	42.9-47.2×7.2-7.9
Microbasic b-mastigophores (rare)	27.2-31.5×4.6-5.7
Spirocysts (rare)	32.9-35.8×5.0-5.5
Filaments:	
Microbasic p-mastigophores	28.6-31.5×7.2-7.9
Column:	
Basitrichous isorhizas	14.3-22.9×3.6-4.3
Microbasic p-mastigophores	20.0-35.8×7.4-10.0
	45.8-61.5×11.5-14.3
Microbasic b-mastigophores	14.3-24.3×4.6-6.5
Spirocysts	21.5-41.5×4.3-7.2

DISCUSSION

The scleractinians found in Korean waters are 17 species in six families, of which seven species in five families are examined in the present study. The primitive family Thamnasteriidae among seven families is excluded in this examination, because the tissues of *Psammocora profundacella* are unsuitable for taking out of the colonies.

In Korean scleractinians, as shown in Table 1, six kinds of cnidae are found in all, namely three

Table 1. Distribution of six kinds of cnidae in Korean scleractinians.

	Haplonemes			Heteronemes		Spirocysts
	Atrichous isorhizas	Basitrichous isorhizas	Holotrichous isorhizas	Microbasic p-mastigophores	Microbasic b-mastigophores	
Poritidae:						
<i>Alveopora japonica</i>		+	+	+	+	+
		(very rare)				(very rare)
Rhizangiidae:						
<i>Culicia japonica</i>			+	+	+	+
Caryophylliidae:						
<i>Caryophyllia japonica</i>			+	+		+
<i>Desmophyllum insignis</i>		+	+	+	+	+
		(rare)				
Flabellidae:						
<i>Flabellum transversale</i>		+	+	+	+	+
		(rare)				
Dendrophylliidae:						
<i>Dendrophyllia cribrosa</i>	+		+	+	+	+
<i>Tubastraea coccinea</i>		+	+	+	+	+

Table 2. The distribution of cnidae in relation to their parts.

	Tentacles					Actinopharynx					Filaments					Column								
	A	B	H	p-	b-	S	A	B	H	p-	b-	S	A	B	H	p-	b-	S	A	B	H	p-	b-	S
<i>Alveopora japonica</i>				+	+	+	+					+				+	+			+			+	
<i>Culicia japonica</i>					+	+	+			+		+				+	+							+
<i>Caryophyllia japonica</i>				+	+		+				+		+			+	+					+	+	
<i>Desmophyllum insignis</i>	+	+	+	+	+	+		+	+	+	+	+		+	+						+	+	+	
<i>Flabellum transversale</i>	+	+	+	+	+	+			+	+	+	+		+	+						+	+	+	+
<i>Dendrophyllia cribrosa</i>	+		+	+	+	+	+			+	+			+	+						+		+	+
<i>Tubastraea coccinea</i>			+	+		+			+	+	+	+			+					+		+	+	+

A: atrichous isorhizas; B: basitrichous isorhizas; H: holotrichous isorhizas; p-: microbasic p-mastigophores; b-: microbasic b-mastigophores; S: spirocysts.

kinds of haplonemes, two kinds of heteronemes and spirocysts. Holotrichous isorhizas, microbasic p-mastigophores and spirocysts are found in all the species examined, the microbasic b-mastigophores in six species, the basitrichous isorhizas rare in four species, and the atrichous isorhizas in one species. Carlgren (1940, 1945) found that the Madreporaria had holotrichs, microbasic p- and b-mastigophores and spirocysts, but the basitrichous and the atrichous isorhizas occur rare in Korean scleractinians.

As shown in Table 2, microbasic p-mastigophores are widely distributed in most parts of all species. The microbasic p-mastigophores and spirocysts are typical components of tentacles, and also holotrichous isorhizas and microbasic b-mastigophores occur next in the tentacles. The actinopharynx has microbasic p- and b-mastigophores and spirocysts in small quantities. In the filaments, all species have microbasic p-mastigophores in great quantities, and holotrichous isorhizas occur in six species. In the column, microbasic p-mastigophores are present in six species, and microbasic b-mastigophores and holotrichous isorhizas in four species. The atrichous isorhizas are present in the tentacles and actinopharynx of *Dendrophyllia cribrosa*. The basitrichous isorhizas occur in small quantities in the tentacles and actinopharynx of *Desmophyllum insignis*, in the tentacles of *Flabellum transversale*, and in the column of *Tubastraea coccinea*.

More researches on the cnidae in different species of scleractinians seem to be necessary for the purpose of the systematic study in further detail.

ABSTRACT

The Korean scleractinians examined in the present study are seven species in five families. They have six kinds of cnidae: atrichous isorhizas, basitrichous isorhizas, holotrichous isorhizas, microbasic p-mastigophores, microbasic b-mastigophores and spirocysts, of which the holotrichous isorhizas, microbasic p-mastigophores and spirocysts are distributed in all species. The atrichous and basitrichous isorhizas are present very rare in Korean scleractinians. Especially the microbasic p-mastigophores are common in most parts of all species.

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Explanation of Plates 1-3

PLATE 1

Figs. 1-6. *Alveopora japonica* Eguchi, 1968.

- 1-3. microbasic p-mastigophores, filament.
4. discharged basitrichous isorhiza, column.
5. holotrichous isorhiza, tentacle.
6. microbasic b-mastigophore, tentacle.

Figs. 7-10. *Culicia japonica* Yabe & Eguchi, 1936.

7. microbasic p-mastigophore, tentacle.
8. microbasic b-mastigophore, filament.
9. holotrichous isorhiza, filament.
10. microbasic b-mastigophore, tentacle.

Figs. 11-18. *Tubastraea coccinea* (Ehrenberg, 1834).

11. basitrichous isorhiza, column.
12. microbasic p-mastigophore, column.
13. microbasic p-mastigophore, tentacle.
14. holotrichous isorhiza, actinopharynx.
15. discharged spirocyst, column.
16. microbasic b-mastigophore, column.
17. discharged basitrichous isorhiza, column.
18. microbasic p-mastigophore, column.

PLATE 2

Figs. 1-5. *Desmophyllum insignis* (Duncan, 1876).

1. microbasic b-mastigophore and spirocysts, tentacle.
2. microbasic p-mastigophore, tentacle.
3. basitrichous isorhiza, tentacle.
4. microbasic p-mastigophore, column.
5. holotrichous isorhiza, tentacle.

Figs. 6-11. *Flabellum transversale* Moseley, 1881.

6. microbasic p-mastigophore, tentacle.
7. discharged holotrichous isorhiza, tentacle.
8. spirocyst, tentacle.
9. microbasic b-mastigophore, actinopharynx.
10. microbasic p-mastigophore, tentacle.
11. microbasic b-mastigophore, tentacle.

PLATE 3

Figs. 1-8. *Dendrophyllia cribrosa* M. Edw. & H., 1860

1. holotrichous isorhiza, column.
2. holotrichous isorhiza, tentacle.
3. spirocyst, tentacle.
4. microbasic p-mastigophore, filament.
5. microbasic p-mastigophore, tentacle.
6. atrichous isorhiza, tentacle.

7. discharged microbasic p-mastigophore, filament.

8. microbasic b-mastigophore, tentacle.

Figs. 9-11. *Caryophyllia japonica* Marenzeller, 1888.

9. holotrichous isorhiza and spirocysts, tentacle.
10. microbasic p-mastigophore, tentacle.
11. microbasic p-mastigophore, filament.

PLATE 1



PLATE 2

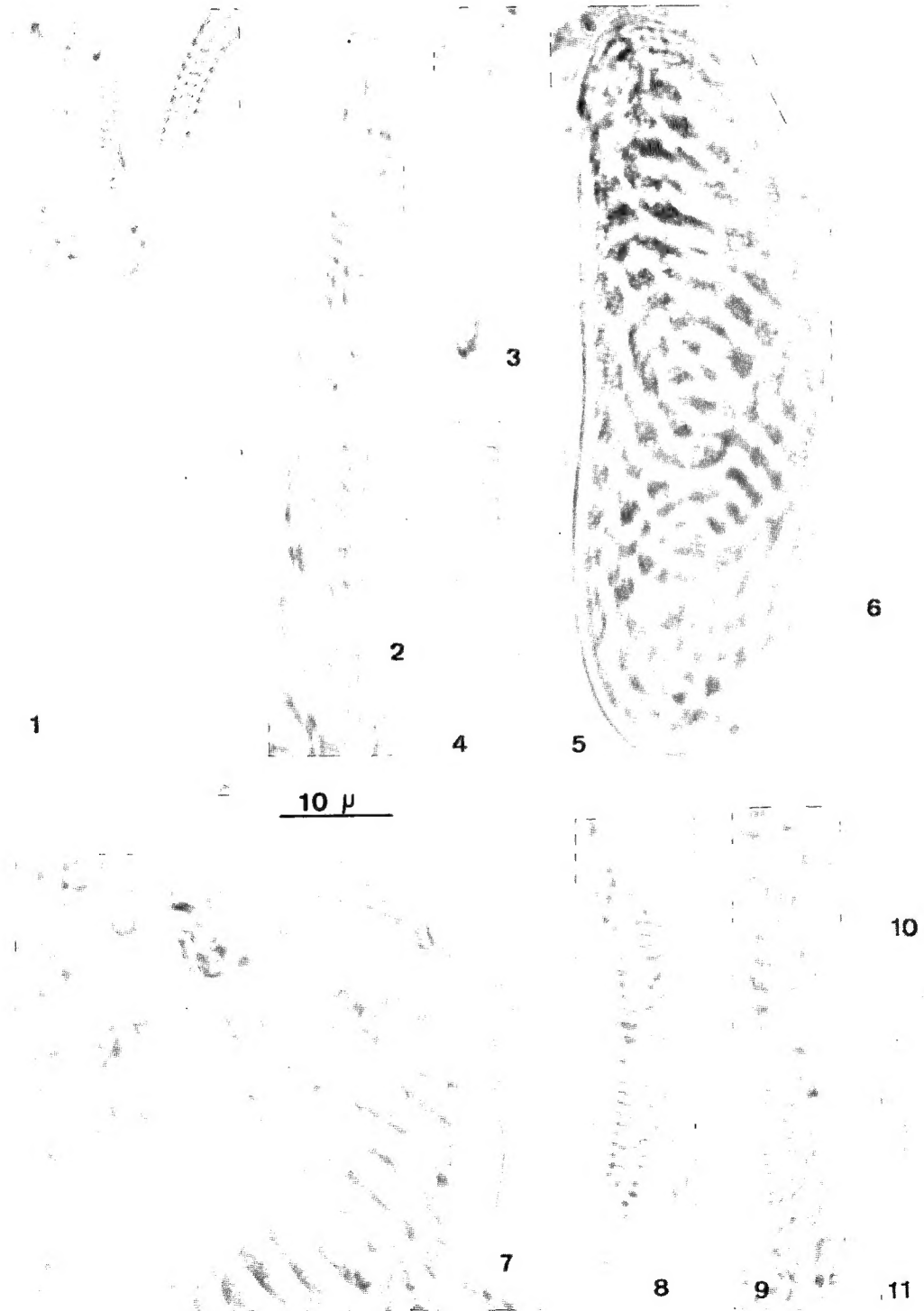


PLATE 3

